ABSTRACT OF THE DISCLOSURE

Systems and methods for detecting the presence of biomolecules in a sample using biosensors that incorporate resonators which have functionalized surfaces for reacting with target biomolecules. In one embodiment, a device includes a piezoelectric resonator having a functionalized surface configured to react with target molecules, thereby changing the mass and/or charge of the resonator which consequently changes the frequency response of the resonator. The resonator's frequency response after exposure to a sample is compared to a reference, such as the frequency response before exposure to the sample, a stored baseline frequency response or a control resonator's frequency response.